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Physalis alkekengi: A review of Its Therapeutic Effects

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ABSTRACT

Medicinal plants have long been used in medicine to treat diseases. There has been a widespread approach to use nature-based, especially plant-based, drugs in recent years. *Physalis alkekengi*, is an herbaceous, perennial plant. The leaves are tailed and paired from family in Solanaceae. This plant can speed up excretion of uric acid and is used for renal and urinary tract diseases, gout, and rheumatism. Other properties of this plant include anti-gout, anti-inflammatory, antibacterial, analgesic, laxative, diuretic, antimitotic, and malaria-treating properties. Moreover, modern medical investigations have demonstrated that *P. alkekengi* is effective on immunity system, cancer, thyroid hormones, liver enzymes, and sexual and reproductive hormones. Phytochemical investigations indicate that this plant contains alkaloids, glucocorticoids, lycopene, ethanolic compounds, and vitamin C. The therapeutic effects of *P. alkekengi* can be due to these antioxidant compounds. This review article aimed to present the phytochemical and pharmaco-therapeutic properties of this plant.

KEYWORDS: Medicinal plants, *Physalis alkekengi*, Therapeutic effects.

1. INTRODUCTION

There has been a widespread approach to use nature-based drugs in recent years. Medicinal plants have long been used in medicine to treat diseases (Ebrahimie, 2015; Amirmohammadi, 2014; Bahmani, 2012; Eftekhari, 2012; Bahmani, 2013; Gholami-Ahangaran, 2012). Having knowledge about medicinal plants, as a medicinal resource, which have various therapeutic effects dates back to the first human beings (Jalali, 2009; Delfan, 2014; Mozaffari Nejad, 2013). When there were no chemical drugs, human beings used medicinal plants to treat diseases and complications (Asadi Samani, 2014; Delfan, 2014; Bahmani, 2014; Saki, 2014; Bahmani, 2014; Bahmani, 2014; Karamat, 2014; Bahmani, 2014). The medicinal plants are in general cheap and accessible around the world (Bahmani, 2014; Delfan, 2015; Bahmani, 2015; Bahmani, 2015; Ghasemi, 2015; Bahmani, 2015). Implemented as alternative health care treatment for prevent of side effects than chemical drugs (Delfan, 2014; Bahmani, 2013; Bahmani, 2015; Delfan, 2015; Delfan, 2015; Mozaffari Nejad, 2013). However, some parts of medicinal plants are specified as natural products that used for antimicrobial agents. Also, other uses for natural antioxidants contain food additives, bio pharmaceuticals and bioactive nutraceuticals (Mozaffari Nejad, 2014; Eslami, 2016; Bahmani, 2016). *Physalis alkekengi* L. is one of these plants being herbaceous, perennial plant. The leaves are tailed and paired from family Solanaceae. This plant can speed up excretion of uric acid and is used for renal and urinary tract diseases, gout, and rheumatism. Other properties of this plant include anti-gout, anti-inflammatory, antibacterial, analgesic, laxative, diuretic, antimitotic, and malaria-treating properties. Moreover, modern medical investigations have demonstrated that *P. alkekengi* is effective on immunity system, cancer, thyroid hormones, liver enzymes, and sexual and reproductive hormones. Phytochemical investigations indicate that this plant contains alkaloids, glucocorticoids, lycopene, ethanolic compounds, and vitamin C. The therapeutic effects of *P. alkekengi* L. can be due to these antioxidant compounds. This review article aimed to present the phytochemical and pharmaco-therapeutic properties of this plant (Sadeghi, 2007; Ge, 2009; Gharib Naseri, 2008; Namjoyan, 2015; Helvaci, 2010).

Ethnobotany of *Physalis alkekengi:* Husk tomato, scientifically called *Physalis alkekengi*, is an herbaceous, perennial plant. The leaves are tailed and paired from family Solanaceae (Sadeghi, 2007; Ge, 2009; Gharib Naseri, 2008).

Effective compounds of *P. alkekengi:* Alkaloids and glucocorticoids are the main chemical compounds of this plant. *P. alkekengi* fruit contains lycopene, alkaloids, ethanolic compounds, and a large amount of vitamin C. *P. alkekengi* contains, glucocorticoids, alkaloids, lycopenes, ethanolic compounds, and vitamin C (Sadeghi, 2007; Ge, 2009; Gharib Naseri, 2008; Namjoyan, 2015).

Therapeutic effects of *P. alkekengi* according to traditional medicine: This plant can speed up excretion of uric acid and is used for renal and urinary tract diseases, gout, and rheumatism. Other properties of this plant include anti-gout, anti-inflammatory, antibacterial, analgesic, laxative, diuretic, antimitotic, and malaria and syphilis treating (Sadeghi, 2007; Ge, 2009; Gharib Naseri, 2008; Namjoyan, 2015; Helvaci, 2010; Vessal, 1991; Nasimi, 200).

Therapeutic effects of *P. alkekengi* according to modern medicine: A review of the findings of different studies indicates that *P. alkekengi* can be effective on immunity system, cancer, thyroid hormones, liver enzymes, and sexual and reproductive hormones shown in Table 1 (Sadeghi , 2007; Ge, 2009; Gharib Naseri, 2008; Namjoyan, 2015;

Zarei, 2011; Helvaci, 2010; Vessal, 1991; Vessal, 2004; Nasimi, 2008; Soares, 2003; Shekar Forosh, 2012; Changizi Ashtiyani, 2011; Javdan, 2011).

Table.1.Therapeutic effects of *Physalis alkekengi* according to modern medicine.

Effect of *P. alkekengi* on immunity system	Findings have demonstrated that physalins *P. alkekengi* decreased inflammation through decreasing neutrophils infiltration and inhibiting the formation of interleukin-6 and interleukin-12.
Effect of *P. alkekengi* on cancer	A study demonstrated that *P. alkekengi* physalins can help to inhibit cancer cells growth by stopping the cells at G2/M phase of cell cycle. In fact, the effects of physalins are exerted through decrease in the expressions and activities of the cyclines A and B and the activity of Cdc2 and increase in the phosphorylation of Cdc2.
Effect of *P. alkekengi* on thyroid hormones	An experimental study demonstrated that *P. alkekengi* extract caused increase in the concentrations of T3 and T4 hormones. The increase in thyroid hormones is due to anti-steroidal compounds that cause inhibition of secretion of catecholamines and increase in plasma proteins such as albumin, which causes increase in thyroid hormones in plasma.
Effect of *P. alkekengi* on liver enzymes and blood biochemical factors	A study demonstrated that aqueous extract of *P. alkekengi* contains ascorbic acid and polyphenols. Moreover, this extract was able to exert positive antioxidant activity alongside inhibitory activity on lipids peroxidation, and was a free radical scavenger. Intraperitoneal administration of rats with *P. alkekengi* extract caused increase in alanine aminotransferase aspartate aminotransferase, albumin, and total protein, while no significant changes were seen in the amounts of bilirubin, creatinine, uremia nitrogen, and the activity of alkaline phosphatase.
Effect of *P. alkekengi* on fertility and sexual hormones	An investigation showed that intraperitoneal administration of pregnant rats with 400 mg/kg of P. alkekengi for eight days caused a significant decrease in progesterone and activity of 3beta-hydroxysteroid dehydrogenase. In this work, the activity of 20alpha-hydroxysteroid dehydrogenase was also measured. Another work investigated the effect of *P. alkekengi* on fertility in rats. This study demonstrated that intraperitoneal administration of 150 mg/kg *P. alkekengi* for 56 consecutive days caused contraceptive and antispermatogenic effects.

Modern medical investigations have demonstrated that *P. alkekengi* is effective on immunity system, cancer, thyroid hormones, liver enzymes, and sexual and reproductive hormones. Phytochemical investigations indicate that this plant contains alkaloids, glucocorticoids, physalis, lycopene, ethanolic compounds, and vitamin C. It has antioxidant activity and the some therapeutic effects of *P. alkekengi* have been attributed to its antioxidant compounds (Sadeghi, 2007; Ge, 2009; Gharib Naseri, 2008; Namjoyan, 2015; Zarei, 2011; Helvaci, 2010; Vessal, 1991; Vessal, 2004; Nasimi, 2008).

Antioxidants are substances that are able to prevent harmful chemical reactions in them oxygen is combined with other substances (Rafieian Kopaie and Baradaran, 2013; Baradaran, 2014; Nasri and Rafieian-Kopaei, 2014; Rafieian Kopaei, 2013). Antioxidant can delay undesirable qualities of foods such as rancidity of various foods. They are a wide variety of compounds such as aromatic amines and phenolic compounds. Phenolic compounds are present in numerous medicinal plants (Nasri and Rafieian-Kopaei, 2013; Baharvand Ahmadi, 2016; Nasri, 2014). These phenolic compounds have antioxidant activity and can combat oxidative stress. Hence, they are used for prevention and treatment of numerous diseases (Bahmani, 2016; Sarrafchi, 2016; Nasri, 2015; Akhlaghi, 2011). Other than disease, antioxidants may be used to delay the development of rancidity. For this, organic antioxidants such as propyl gallate, butylated hydroxytoluene (BHT), or butylated hydroxyanisole (BHA) are usually used. Also, these antioxidants used in oil products. However, there are limitations on quantity of antioxidants that may be used. Hence, medicinal plants such as *P. alkekengi* L. which have antioxidant activity might be preferred to synthetic antioxidants. An important subject that should be noted is that this plant is effective in numerous diseases such as diabetes mellitus, atherosclerosis, cancer, cardiovascular diseases, infection and toxicities which most of them are associated with oxidative stress (Baradaran, 2012; Rabiei, 2014; Rahimian, 2013; Rahnama, 2015; Rafieian-Kopaei, 2014; Azizkhani, 2011; Kamkar, 2013). Therefore, patient who have one of these diseases may benefit from antioxidant property of this plant, too. It should be noted that diseases have various mechanism (Baradaran, 2013; Heidarian, 2013; Billah, 2016; Rafieian Kopaie, 2013; Nasri and Rafieian-Kopaei, 2013). This plant also has a wide variety of compounds which have therapeutic effects and antioxidant property of this plant may help them to be treated better.

2. CONCLUSION

In the present review, it is suggested that activity of Physalis alkekengi investigated against therapeutic properties. The isolation, identification of active principles and pharmacological studies of the active phyto-constituents may be considered and studied elaborately to treat effectively for therapeutic effects.

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